Protecting Children's Health in the Future: Adapting to a Changing World

U.S. EPA's Office of Research and Development

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EPA's Public Health Mission

The mission of EPA is to protect human health and the environment.

- **EPA is a public health agency.**
- **Protecting children's health is a critical part of our mission.**

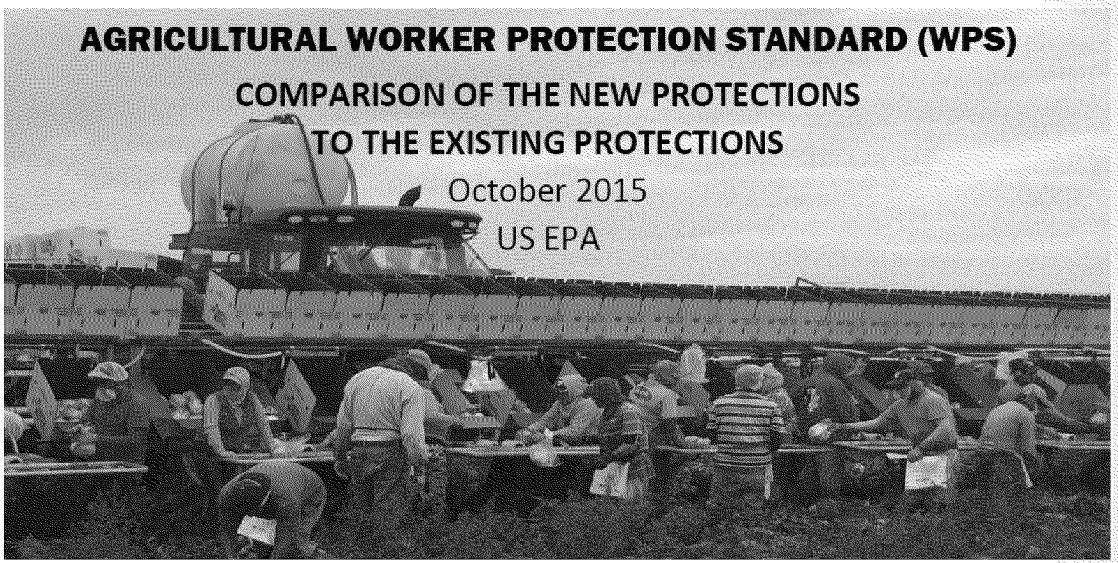
Protecting Children's Health

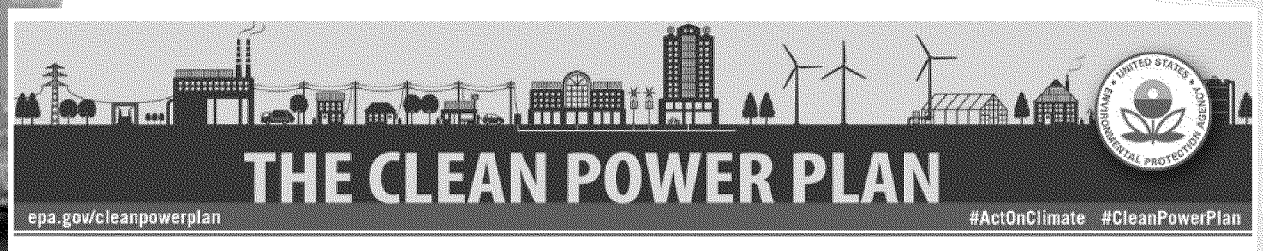
2015 Final
8-hour Ozone Standards

Primary: 70 ppb

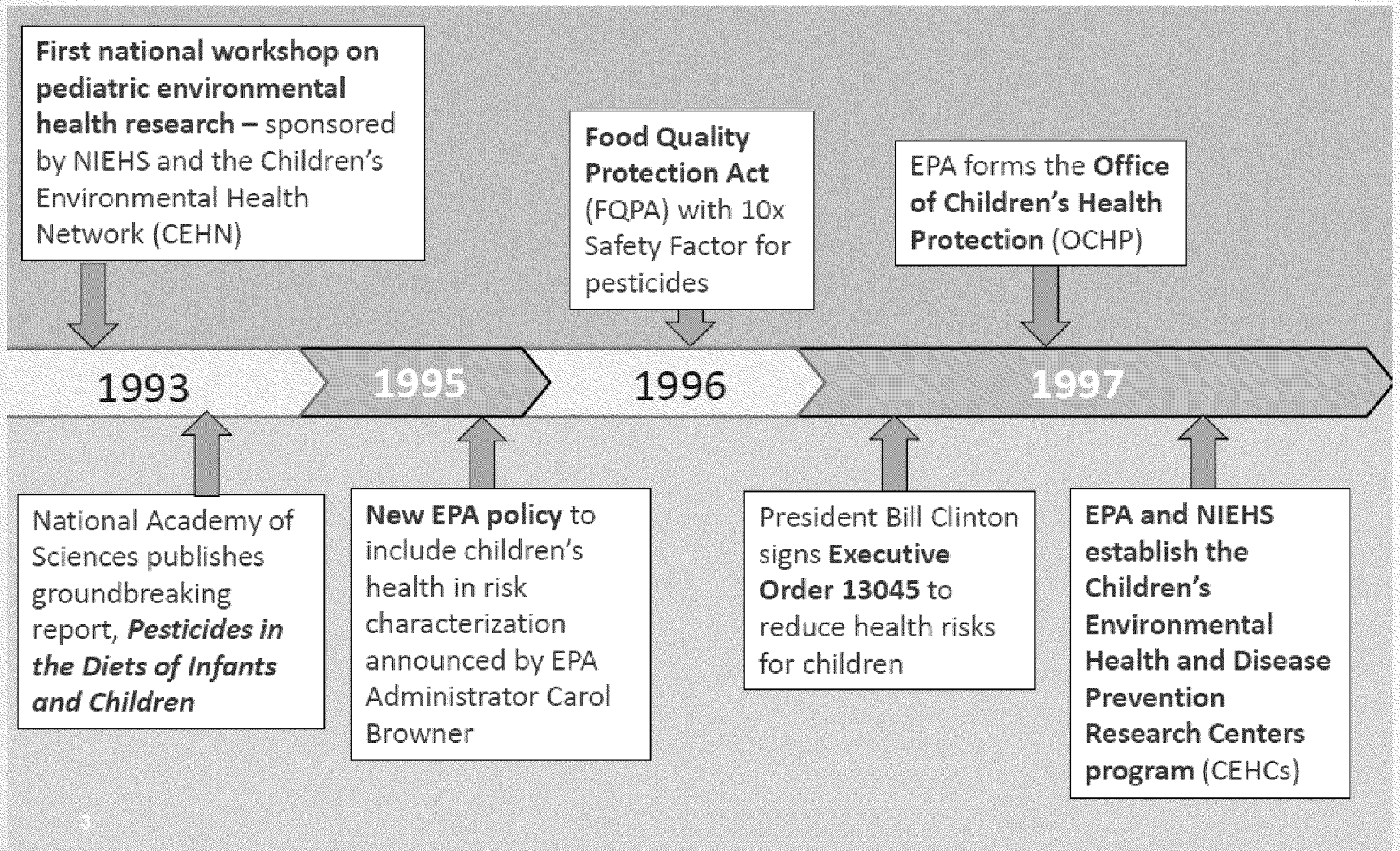
Secondary: 70 ppb

Areas will meet the standards if the 4th highest daily maximum 8-hour ozone concentration per year, averaged over three years, is equal to or less than 70 ppb.



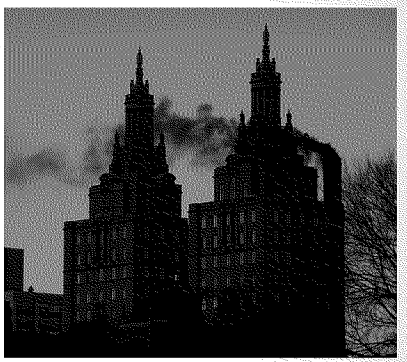


EPA Children's Health Timeline

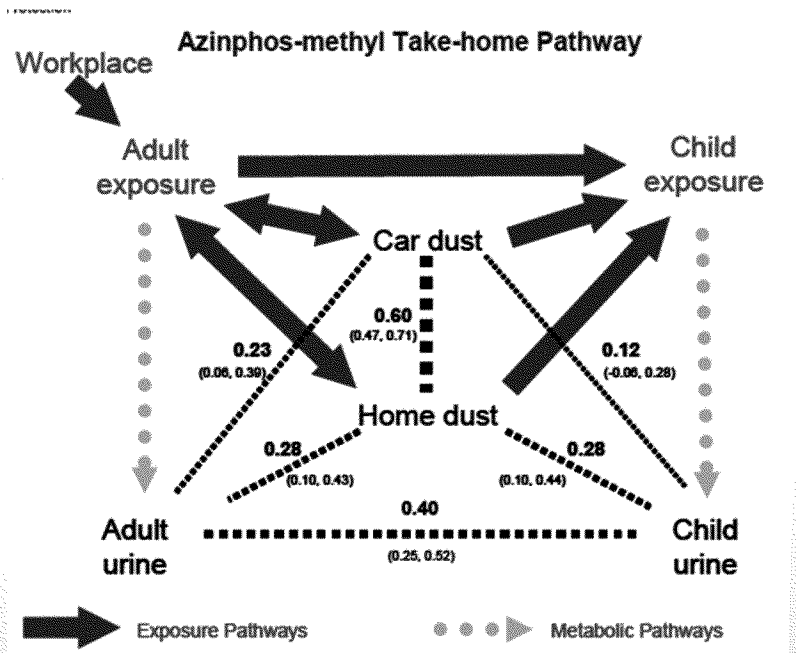


Children's Center Impacts

- **Research findings influenced the passing of:**
  - **NYC Pesticide Reduction Law (Intro 329A), 2007**
  - **Neighborhood Notification Law (Intro 328A), 2007**



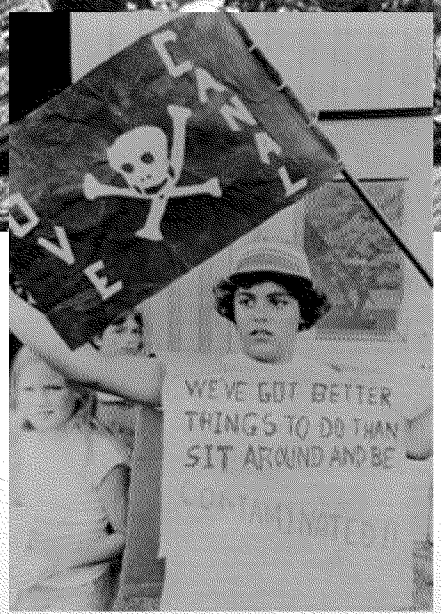
- **Evidence of the take-home pathway from the University of Washington Children's Center was influential in EPA's decision to phase out azinphos-methyl (Class 1) by 2011.**



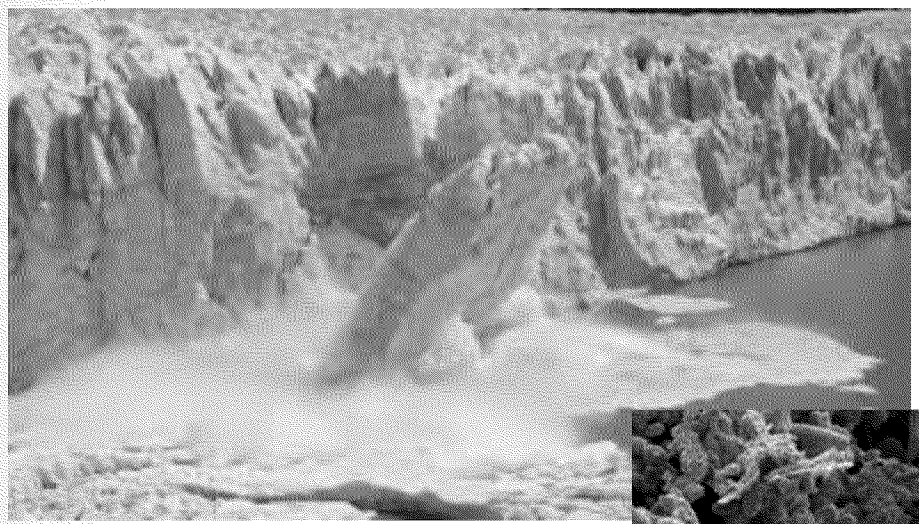
These Impacts are Terrific…

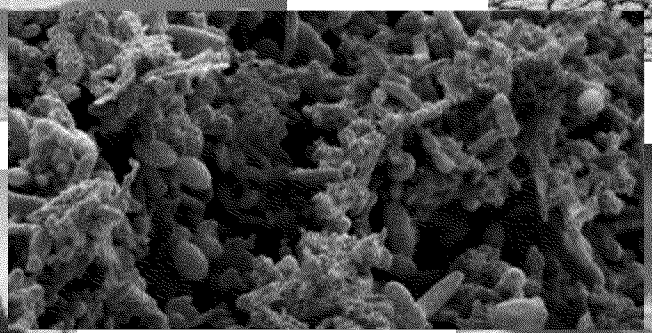
But how do we tackle some of the big challenges on the horizon?

Environmental Challenges of the 1960s and 1970s



Today's Environmental Challenges

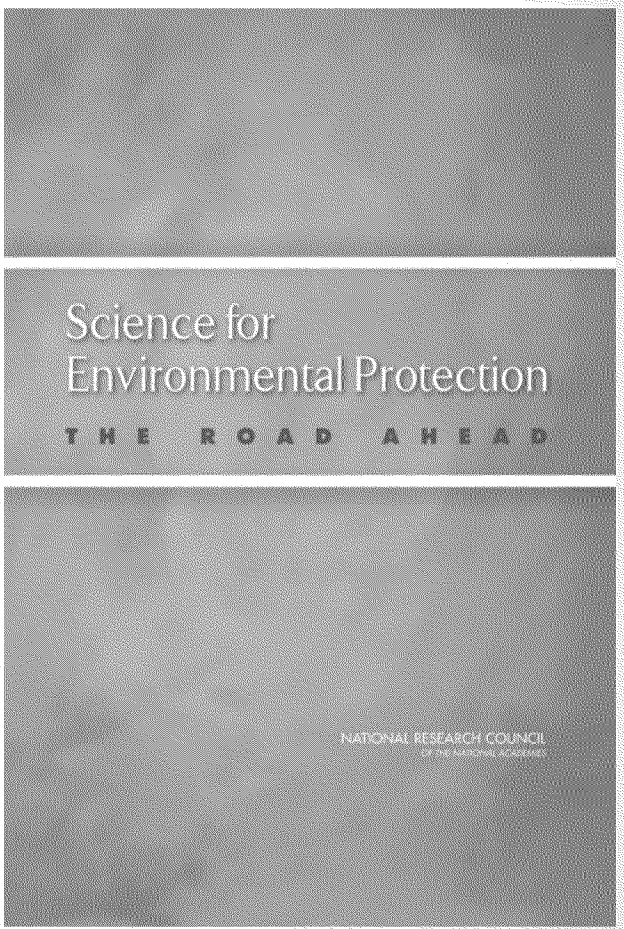




Wicked Problems

The challenges associated with environmental protection today:

- **Complex**
- **Affected by many interacting factors**
- **Various spatial scales and long temporal scales**
- **May have global implications**
- **Difficult to define**
- **Unstable and socially complex**
- **Have no clear solution or end point**
- **Extend beyond the understanding of one discipline**



Are the approaches of the past sufficient for today's wicked problems?

Looking to the Future

In order to solve tomorrow's "wicked problems," we will need to:

- **Understand the context of the problem**
- **Consider all of the many dimensions of a problem**
- **Understand that the ecosystem and human health are inherently connected.**
  - **The economy and human health and well-being cannot function without a healthy ecosystem.**
  - **Health is not just about health care (broader determinants of health)**

Looking to the Future

What do we need to solve tomorrow's "wicked problems"?

- **Strong up-front problem formulation**
- **Systems approaches and tools**
- **Techniques and tools to integrate difference types of data from multiple disciplines (e.g., eco, human health, social sciences)**
- **Draw on new technologies (e.g., high throughput chemical screening)**
- **Consider novel techniques (e.g., citizen science)**
- **Science translation**
- **New approaches and frameworks??**
  - **Health risk assessment**
  - **Eco risk assessment**
  - **Lifecycle assessment**
  - **Health impact assessment**

Public Health Problem Solving Approach

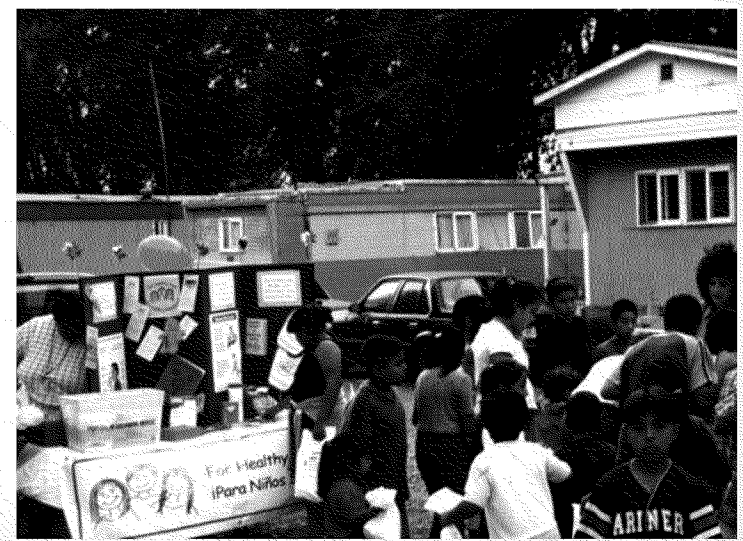
- Define the problem
- Measure the magnitude of the problem
- Develop a framework for key determinants, including:
  - Biologic
  - Epidemiologic
  - Social
  - Cultural
  - Economic
  - Political factors
- Identify and develop intervention and prevention strategies
- Set priorities and recommend policies
- Implement programs
- Evaluate

Guyer B. Problem-solving in public health. In: Armenian H, editor; Shapiro S, editor. Epidemiology and Health Services Research. Oxford University Press; New York: 1998. pp. 15–26

Children's Center Research

The Children's Centers and Pediatric Environmental Health Specialty Units (PEHSUs) have provided some of the groundwork and research we need to move toward new approaches for solving tomorrow's challenges:

- **Multi-disciplinary approaches**
- **Non-chemical stressors and social factors**
- **Translation/Outreach Core**
- **Intervention/prevention**



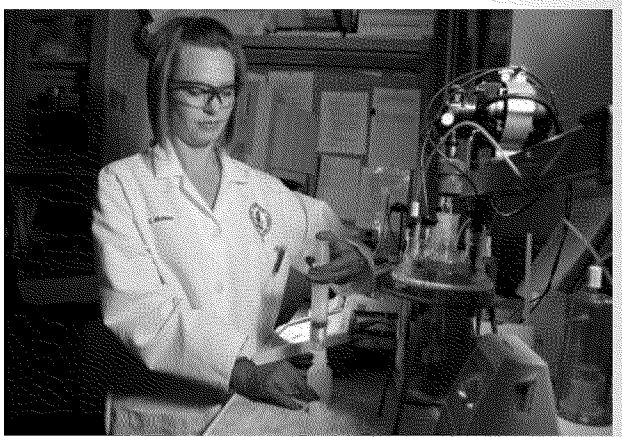
Broad Goals for EPA Research

- **Breaking down silos**
- **Following a systems approach (Health in All Policies)**
- **More engagement with partners like the public health community and states**
- **Building a community of science and identifying new science leaders**
- **Improving science communication and translation**
- **Proactive planning via Strategic Research Action Plans and Research Roadmaps for cross cutting issues**

EPA Children's Health Research Roadmap

Why is this important:

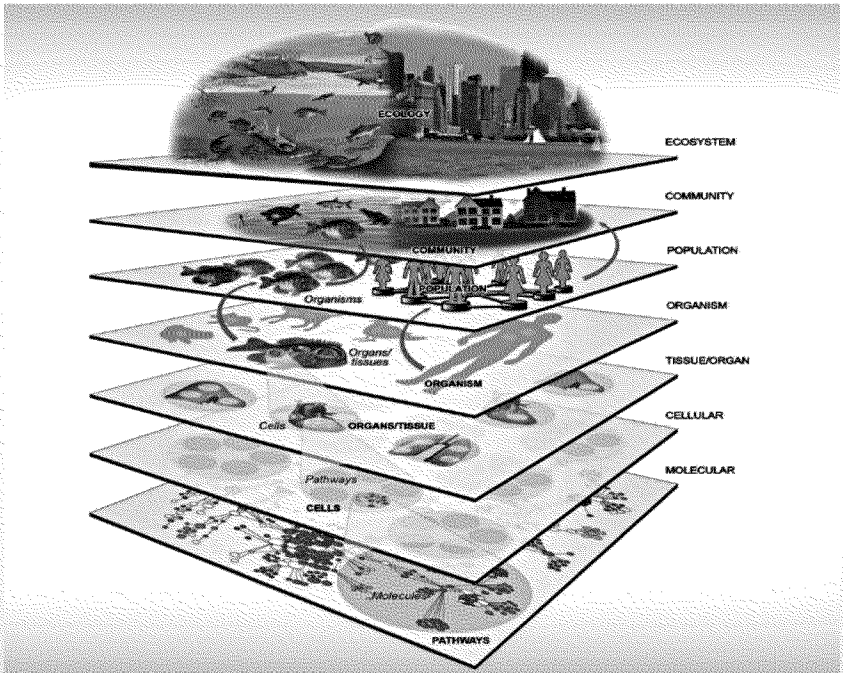
- Reflects EPA and State priorities and challenges
- Fosters cross EPA collaboration
- Ensures better organized collaboration with stakeholders
- Improves translation and communication of results

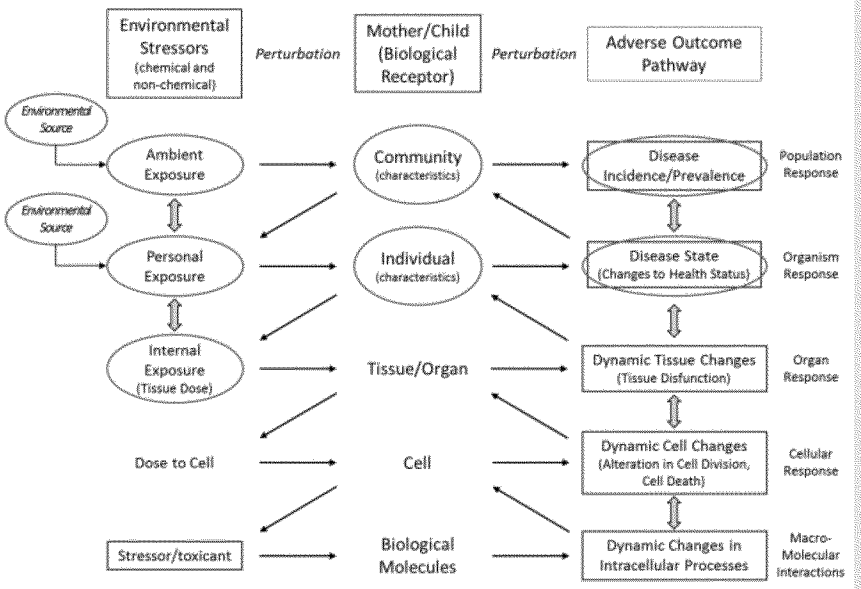


Bottom Line:

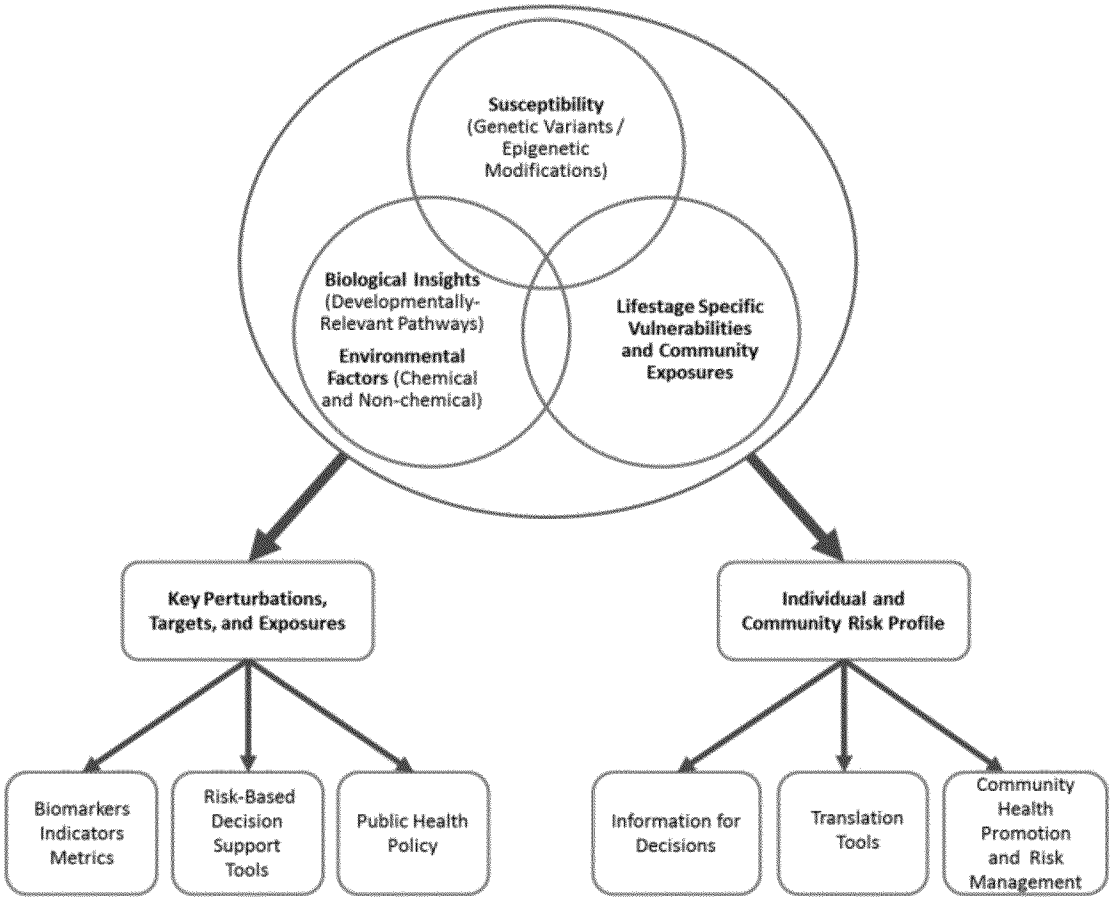
This roadmap ensures that EPA continues to produce world class research that federal, state, local, and tribal decision makers need in order to properly protect the health of our children and the environment.

Systems approach that use continuum of data to understand children's environmental health issues





The Children's Health Roadmap includes a framework that ensures better translation of research findings



Children's Environmental Health Research Translation Framework (Adapted from (Cohen Hubal et al., 2010))

Research Roadmap Already Affecting Positive Change

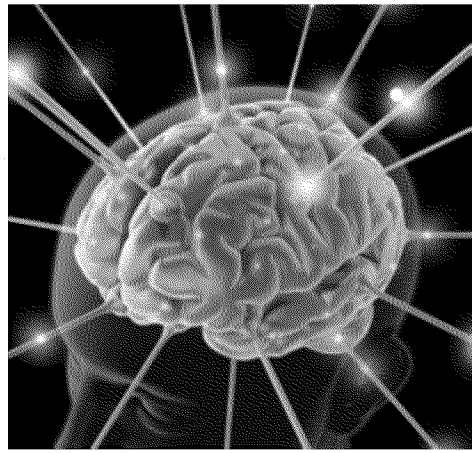
- Adverse Outcome Pathway (AOP) frameworks are now being applied to EPA research in our Tox21 program which will allow for:
  - Improvements in our knowledge of chronic toxicity, delayed toxicity, epigenetic and transgenerational effects of chemicals on adults and children
  - Better integration of life stages into toxicity modeling
  - Allows for more efficient application of research for chemical and site specific risk assessments

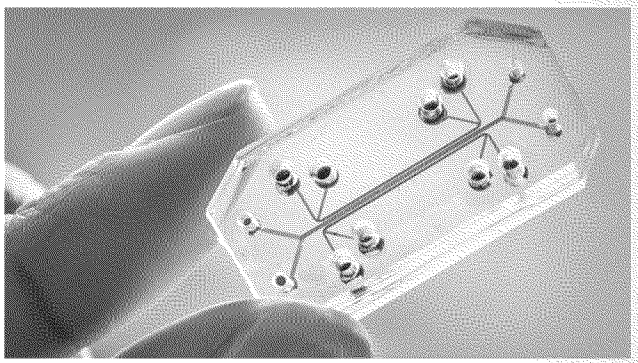
- **Bottom Line**
  - This will allow us to fill data gaps and incorporate the life stages of children in our research so that decision makers have the information they need to better protect our kids at every stage of

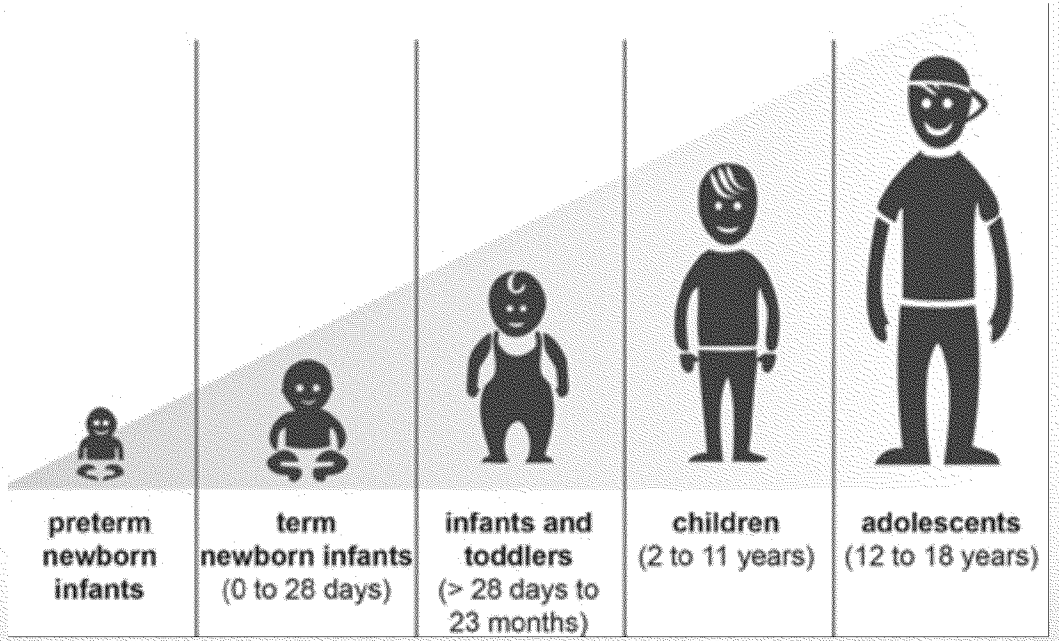
Environ Toxicol Chem. 2010 Mar;29(3):730-41. doi: 10.1002/etc.34. & https://www2.epa.gov/sites/production/files/2015-09/documents/4_css_strap_2016_draft_final_draft_9_9_15.pdf

Research Roadmap Already Affecting Positive Change: Human Body on a Chip

- EPA is applying the systems approach and the AOP framework to the "brain of a child on a chip"
- Moving towards all cell types in the human body during all life stages on a chip
- Will fill large data gaps and will provide the information that decision makers like you need to better protect the health of children





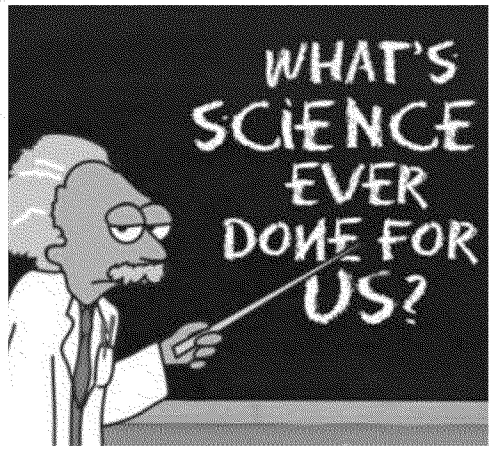


Environ Health Perspect; DOI:10.1289/ehp.1104782 (Chip) and NIH website (brain and childhood development graphic)

What Can You Do?

Work with the Office of Children's Health Protection to help us:

- **Share needs**
- **Build Bridges**
- **Translate Science**
- **Clearly Communicate Science**



Thank You!

Your work has helped improve the health of children across the Nation. It has laid some of the groundwork we need to solve the major environmental challenges ahead of us.